

ELV LAUNCH SERVICES INFORMATION SUMMARY

ELV Launch Services Groundrules/Policy

Expendable Launch Vehicles (ELV) will be procured and provided by NASA under the NASA Launch Services (NLS) or Small Expendable Launch Vehicles (SELVS-KSC) contract. NASA's fixed price launch services contracts include the provision of ELV integration, analysis, and post-flight mission data evaluation, in addition to placement of spacecraft into a designated orbit. NASA also provides technical management of the launch service, coordinates and approves mission-specific integration activities, and provides payload-processing accommodations.

All launch services to be used for missions under this AO are to be consistent with NASA Policy Directive (NPD) 8610.7, NASA Launch Services Risk Mitigation Policy. Expendable launch services acquired from NASA will be managed in accordance with NPD 8610.23, Technical Oversight of Expendable Launch Vehicle (ELV) Launch Services. These NPD's can be accessed through the URLs:

http://nodis.hq.nasa.gov/Library/Directives/NASA-WIDE/Policies/Program_Management/N_PD_8610_7.html

http://nodis.hq.nasa.gov/Library/Directives/NASA-WIDE/Policies/Program_Management/N_PD_8610_23A.html

Launch Vehicle Configuration/Performance

The Offerors should select the minimum ELV configuration(s) that meets their requirements including adequate performance margins. The performance curves (Figures 1-5) reflect the NLS contractual commitments for Circular LEO orbits at 28 deg, Polar, SunSync as well as Elliptical and High Energy. The Offeror should state specifically in the proposal which ELV configuration(s) meet their requirements for this mission. Note that, the Delta II Heavy configuration cannot be flown out of the West Coast.

Launch Service Costs

For purposes of this AO, Figure 6 provides Launch Service cost figures for each of the noted LV-families. Based on the Offeror's selection of the individual ELV configuration(s) that meet their technical requirements, the Offeror should use the respective LV class dollar figures in the overall mission cost. Funding estimates are stated in real-year dollars and assume a launch in December 2006. The funding profiles provide for the launch service, nominal allocation for mission unique launch vehicle modifications/services, mission integration, launch site payload processing, and telemetry support. Any major modifications to the LV must be estimated over-and-above these figures.

NASA ELV Launch Services Point of Contact for Additional Information

Additional information including, but not limited to, availability of other launch vehicle configurations, performance quotes, mission integration inquiries and costs may be obtained from:

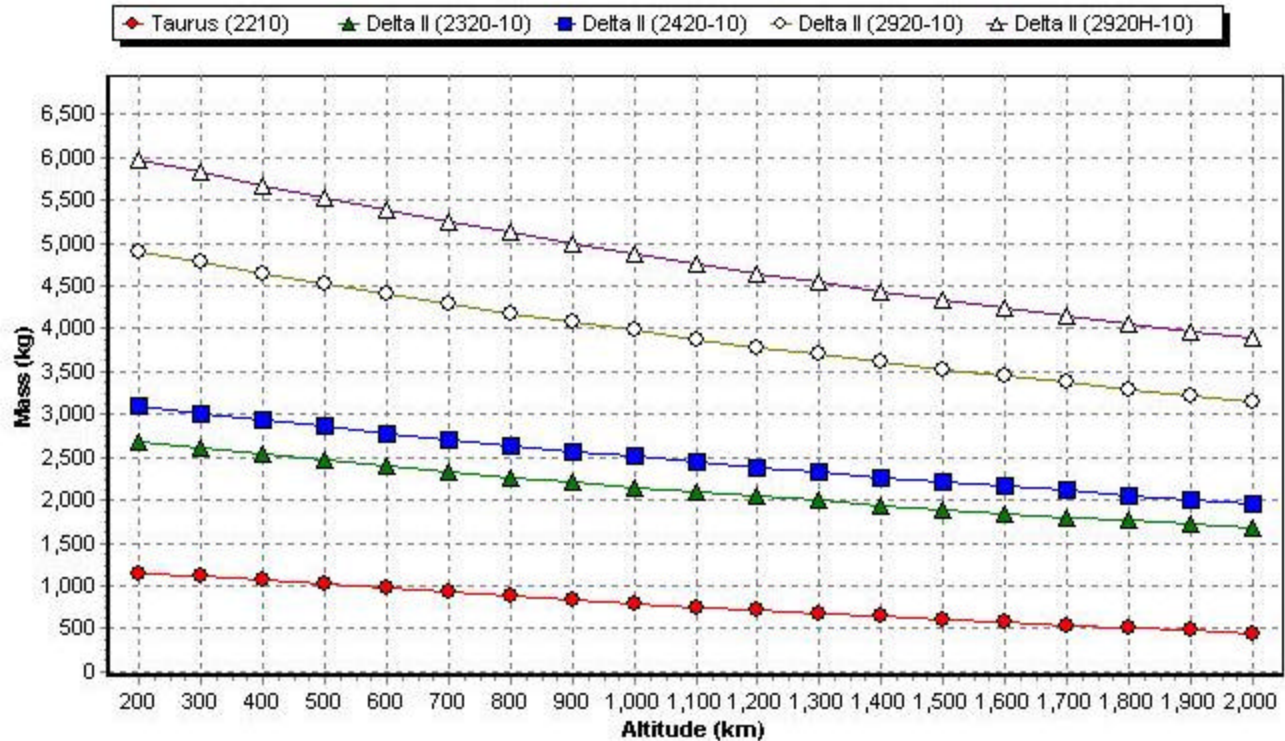
Darrell Foster
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**NASA ELV Performance Estimation Curve(s)
LEO Circular with inclination 28.x
All vehicles except Delta II assume 28.5 degrees inclination, Delta II assumes 28.7 degrees inclination.
Please note ground rules and assumptions below.**



Assumptions:

Taurus (2210)

1. Cape Canaveral Air Station (CCAS) Launch Site
2. 38" Separation System
3. Mass of Entire Separation System is Book-Kept on Launch Vehicle Side
4. 150 ft/sec Guidance Reserve

Delta II (2320-10)

- 1) 6306 payload attach fitting (PAF)
- 2) 99.7% probability of command shutdown (PCS)
- 3) 185 km park orbit altitude

Delta II (2420-10)

- 1) 6306 payload attach fitting (PAF)
- 2) 99.7% probability of command shutdown (PCS)
- 3) 185 km park orbit altitude

Delta II (2920-10)

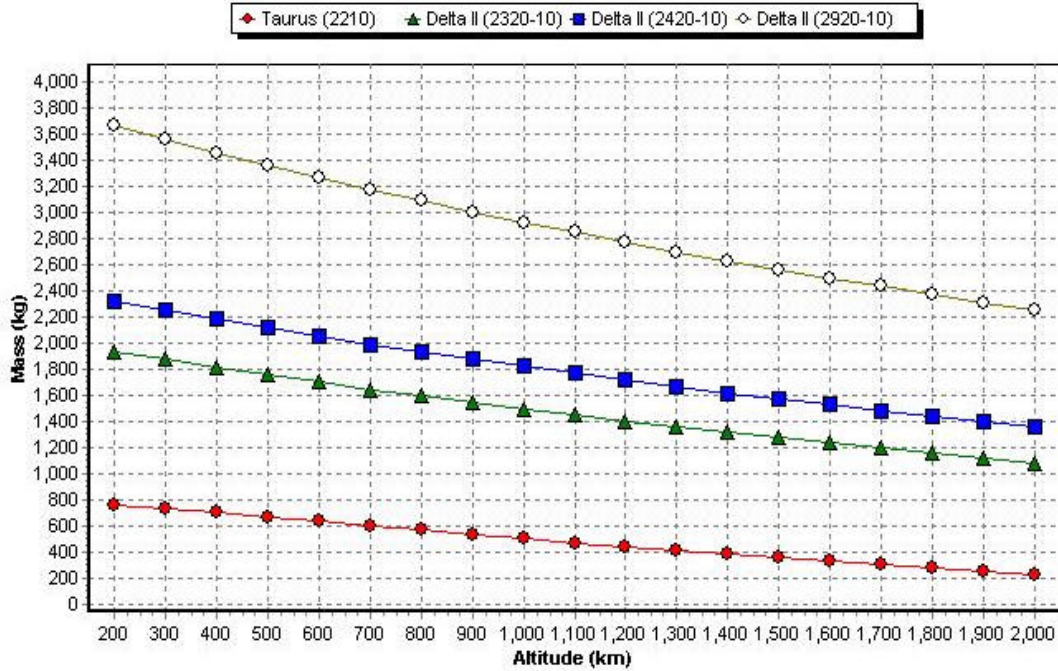
- 1) 6915 payload attach fitting (PAF)
- 2) 99.7% probability of command shutdown (PCS)
- 3) 185 km park orbit altitude

Delta II (2920H-10)

- 1) 6915 payload attach fitting (PAF)
- 2) 99.7% probability of command shutdown (PCS)
- 3) 185 km park orbit altitude

Figure 1 – LEO Orbits @ inclination 28deg

ROCKET PERFORMANCE ESTIMATION CURVES
LEO Circular with inclination Sun-Synchronous
Please note ground rules and assumptions below.



Assumptions:

Taurus (2210)

1. VAFB (Vandenberg Air Force Base) Launch Site - (North)
2. 38" Separation System
3. Mass of Entire Separation System is Book-Kept on Launch Vehicle Side
4. 150 ft/sec Guidance Reserve

Delta II (2320-10)

- 1) 6306 payload attach fitting (PAF)
- 2) 99.7% probability of command shutdown (PCS)
- 3) 185 km park orbit altitude
- 4) Variable inclination
- 5) Reduced launch probability for the 3 meter composite fairing

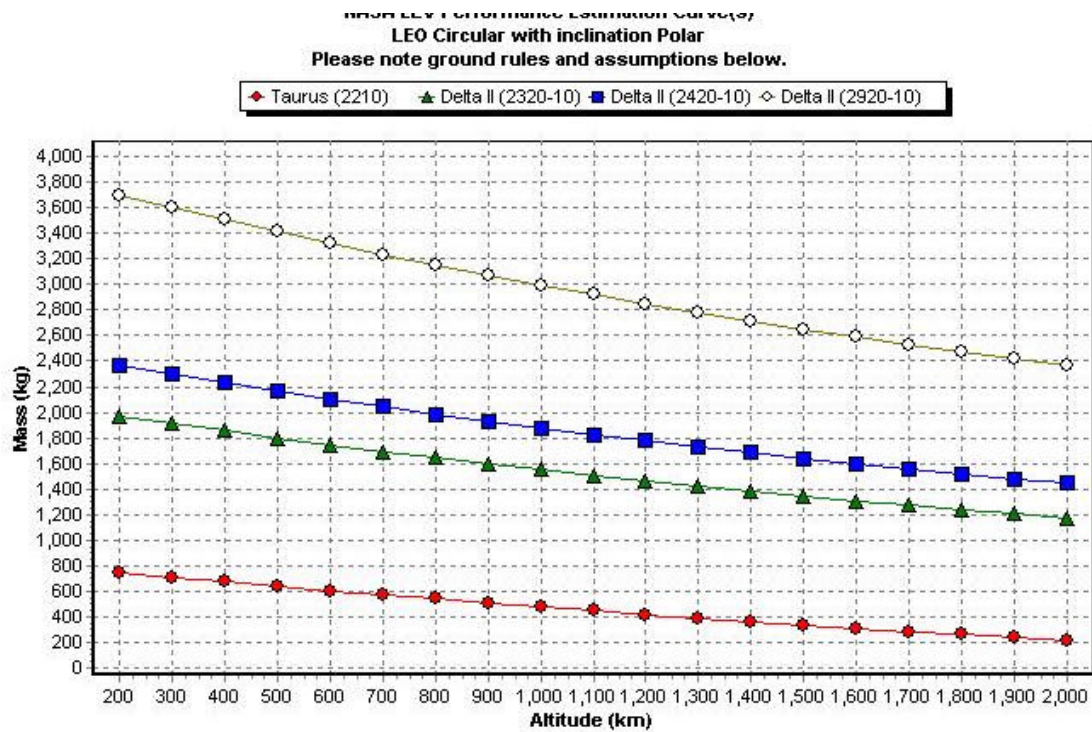
Delta II (2420-10)

- 1) 6306 payload attach fitting (PAF)
- 2) 99.7% probability of command shutdown (PCS)
- 3) 185 km park orbit altitude
- 4) Variable inclination
- 5) Low launch probability for the 9.5 ft composite fairing
- 6) 9.5 ft composite fairing configuration has not flown from the Western Range (WR) and may require a significant increase in cost

Delta II (2920-10)

- 1) 6915 payload attach fitting
- 2) 99.7% probability of command shutdown (PCS)
- 3) 185 km park orbit altitude
- 4) Variable inclination

Figure 2 – LEO Orbits @ SunSync



Assumptions:

Taurus (2210)

1. VAFB (Vandenberg Air Force Base) Launch Site - (North)
2. 38" Separation System
3. Mass of Entire Separation System is Book-Kept on Launch Vehicle Side
4. 150 ft/sec Guidance Reserve

(Last Updated 1/11/2001)

Delta II (2320-10)

- 1) 6306 payload attach fitting (PAF)
- 2) 99.7% probability of command shutdown (PCS)
- 3) 185 km park orbit altitude
- 4) Reduced launch probability for the 3 meter composite fairing

Last Updated February 22, 2001

Delta II (2420-10)

- 1) 6306 payload attach fitting (PAF)
- 2) 99.7% probability of command shutdown (PCS)
- 3) 185 km park orbit altitude
- 4) Low launch probability for the 9.5 ft composite fairing
- 5) Configuration has not flown from the Western Range (WR) and may require a significant increase in cost

(Last Updated 1/6/2001)

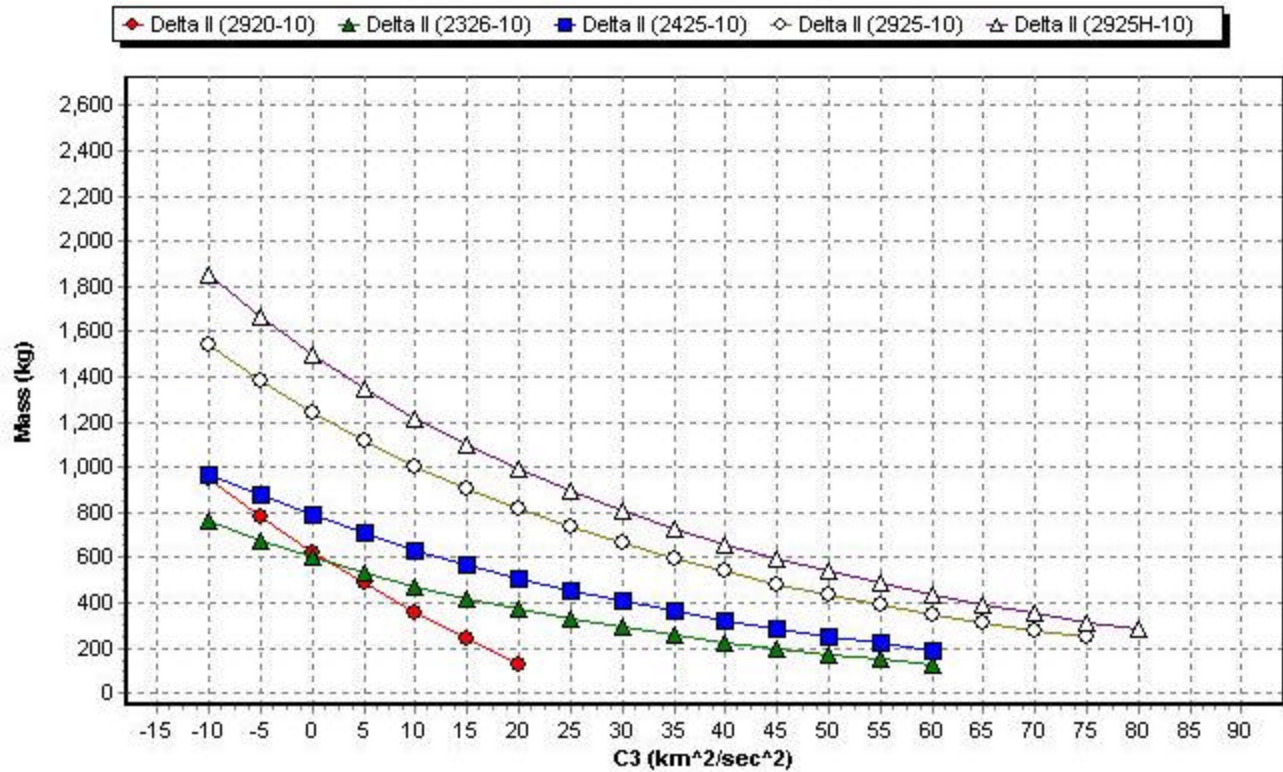
Delta II (2920-10)

- 1) 6915 payload attach fitting (PAF)
- 2) 99.7% probability of command shutdown (PCS)
- 3) 185 km park orbit altitude

(Last Updated 1/6/2001)

Figure 3 – LEO Orbits @ Polar

**NASA ELV Performance Estimation Curve(s)
High Energy Orbits
Please note ground rules and assumptions below.**



Assumptions:

Delta II (2920-10)

ASSUMPTIONS:

1. 6915 payload attach fitting (PAF)
2. 99.7% Probability of Commanded Shutdown (PCS)
3. 185 km park orbit altitude
4. Low spacecraft mass will experience high acceleration
5. 28.7 degree park orbit inclination

Delta II (2326-10)

ASSUMPTIONS:

1. 3724 Payload Attach Fitting (PAF)
2. 99.7 percent Probability of Commanded Shutdown (PCS)
3. 185 km park orbit altitude
4. low spacecraft mass will experience high acceleration
5. 28.7 degree park orbit inclination
6. Despin/NCS not included. If added, this is approximately a 25 kg reduction in performance.
7. NCS mods may require significant increase in cost
8. Missions with maximum spacecraft mass capabilities of 1392 - 1440 kg require stage 2 restarts shorter than the minimum guided burn and therefore entail slightly increased injection errors; alternatively, the minimum guided burn can be provided with reduced mass capability.

Delta II (2425-10)

ASSUMPTIONS:

1. 3712A Payload Attach Fitting (PAF)
2. 99.7 percent Probability of Commanded Shutdown (PCS)
3. 185 km park orbit altitude
4. low spacecraft mass will experience high acceleration
5. 28.7 degree park orbit inclination
6. offload required for C3's <= -4.1835 with 3 m Composite Fairing
7. offload required for C3's <= -7.266 with 2.9 m Fairing
8. spacecraft mass less than 680 kg may require NCS mods resulting in a decrease in performance

Figure 4- ELV Performance Curves – High Energy Curves

9. NCS mods may require significant increase in cost
10. Missions with maximum spacecraft mass capabilities of 804 - 859 kg require stage 2 restarts shorter than the minimum guided burn and therefore entail slightly increased injection errors; alternatively, the minimum guided burn can be provided with reduced mass capability.

Delta II (2925-10)

ASSUMPTIONS:

1. 3712A Payload Attach Fitting (PAF)
2. 99.7 percent Probability of Commanded Shutdown (PCS)
3. 185 km park orbit altitude
4. low spacecraft mass will experience high acceleration
5. 28.7 degree park orbit inclination
6. spacecraft mass less than 680 kg may require NCS mods resulting in a decrease in spacecraft mass
7. NCS mods may require significant increase in cost
8. Missions with maximum spacecraft mass capabilities of 2630 - 2714 kg require stage 2 restarts shorter than the minimum guided burn and therefore entail slightly increased injection errors; alternatively, the minimum guided burn can be provided with reduced mass capability.

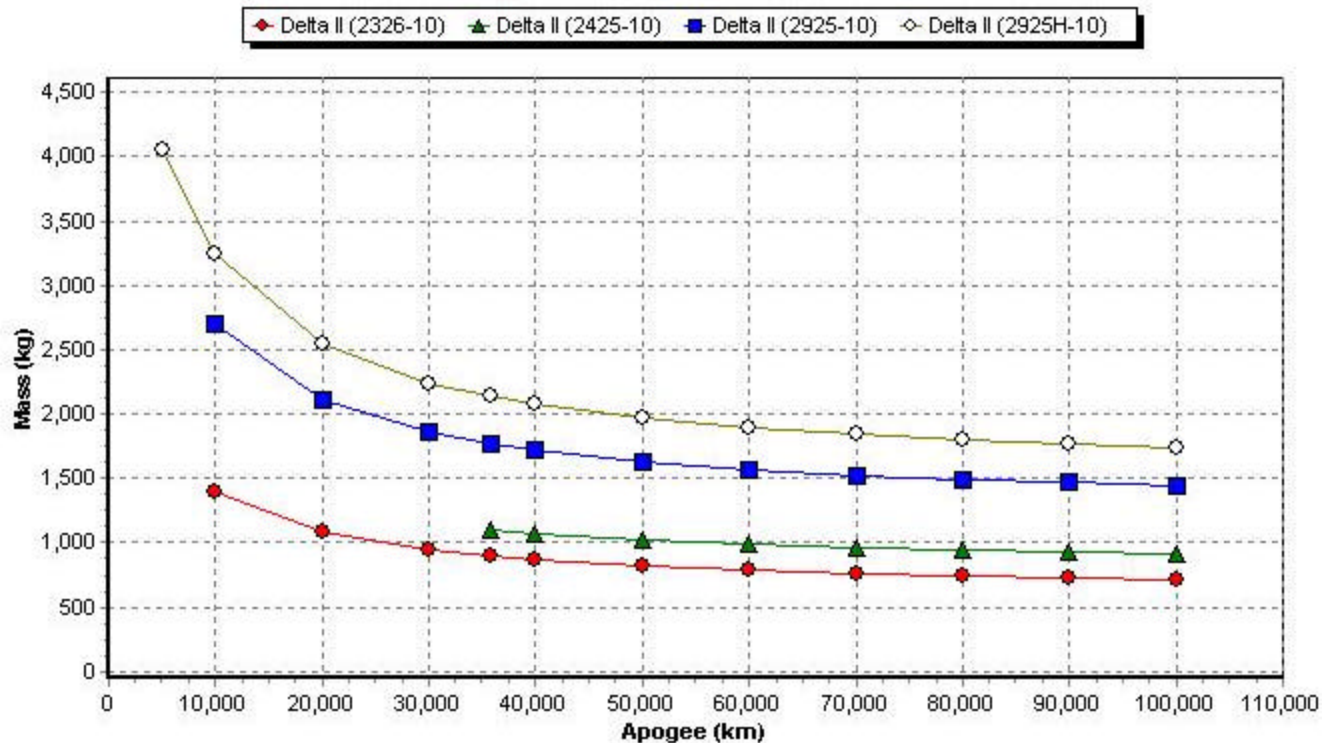
Delta II (2925H-10)

ASSUMPTIONS:

1. 3712A Payload Attach Fitting (PAF)
2. 99.7 percent Probability of Commanded Shutdown (PCS)
3. 185 km park orbit altitude
4. low spacecraft mass will experience high acceleration
5. 28.7 degree park orbit inclination
6. spacecraft mass less than 680 kg may require NCS mods resulting in a decrease in spacecraft mass
7. NCS mods may require significant increase in cost
8. configuration has not yet flown and may require significant increase in cost
9. Missions with maximum spacecraft mass capabilities of 3692 - 3793 kg require stage 2 restarts shorter than the minimum guided burn and therefore entail slightly increased injection errors; alternatively, the minimum guided burn can be provided with reduced mass capability.

Figure 4 - ELV Performance Curves – High Energy Curves

NASA ELV Performance Estimation Curve(s)
Elliptical (fixed low perigee with inclination = 28.x deg)
All vehicles except Delta II assume 28.5 degrees inclination, Delta II assumes 28.7 degrees inclination.
Please note ground rules and assumptions below.



Assumptions:

Delta II (2326-10)

ASSUMPTIONS:

1. 3724 Payload Attach Fitting (PAF)
2. 99.7 percent Probability of Commanded Shutdown (PCS)
3. 185 km park orbit altitude
4. Despin/NCS not included. If added, this is approximately a 25 kg reduction in performance.
5. Missions with maximum spacecraft mass capabilities of 1392 - 1440 kg require stage 2 restarts shorter than the minimum guided burn and therefore entail slightly increased injection errors; alternatively, the minimum guided burn can be provided with reduced mass capability.

Delta II (2425-10)

ASSUMPTIONS:

1. 3712A Payload Attach Fitting (PAF)
2. 99.7 percent Probability of Commanded Shutdown (PCS)
3. 185 km park orbit altitude
4. third stage propellant off-load may be required
5. spacecraft mass less than 680 kg may require NCS mods resulting in a decrease in spacecraft mass
6. NCS mods may require significant increase in cost
7. Missions with maximum spacecraft mass capabilities of 804 - 859 kg require stage 2 restarts shorter than the minimum guided burn and therefore entail slightly increased injection errors; alternatively, the minimum guided burn can be provided with reduced mass capability.

Delta II (2925-10)

ASSUMPTIONS:

1. 3712A Payload Attach Fitting (PAF)
2. 99.7 percent Probability of Commanded Shutdown (PCS)
3. 185 km park orbit altitude
4. spacecraft mass less than 680 kg may require NCS mods resulting in a decrease in spacecraft mass

Figure 5 - ELV Performance Curves – Elliptical Orbit @ 28deg inclination

5. NCS mods may require significant increase in cost
6. Missions with maximum spacecraft mass capabilities of 2630 - 2714 kg require stage 2 restarts shorter than the minimum guided burn and therefore entail slightly increased injection errors; alternatively, the minimum guided burn can be provided with reduced mass capability.

Delta II (2925H-10)

ASSUMPTIONS:

1. 3712A Payload Attach Fitting (PAF)
2. 99.7 percent Probability of Commanded Shutdown (PCS)
3. 185 km park orbit altitude
4. spacecraft mass less than 680 kg may require NCS mods resulting in a decrease in spacecraft mass
5. NCS mods may require significant increase in cost
6. configuration has not yet flown and may require significant increase in cost
7. Missions with maximum spacecraft mass capabilities of 3692 - 3793 kg require stage 2 restarts shorter than the minimum guided burn and therefore entail slightly increased injection errors; alternatively, the minimum guided burn can be provided with reduced mass capability.

Figure 5 - ELV Performance Curves – Elliptical Orbit @ 28deg inclination

MIDEX 5 AO Pricing Estimate

Assumed ATP L-27 months for all, but Athena II ATP of L-30 months

Launch Date:Dec-06 Launch Site:VAFB						
\$M in NOA						
Proposed Vehicle Configurations:	FY-03	FY-04	FY-05	FY-06	FY-07	TOTAL
TAURUS	\$1	\$7	\$20	\$12	\$7	\$47
Delta II 2320	\$1	\$10	\$27	\$26	\$3	\$67
Delta II 2326	\$1	\$10	\$29	\$28	\$4	\$72
Delta II 2420	\$1	\$10	\$28	\$27	\$3	\$69
Delta II 2425	\$1	\$10	\$29	\$28	\$4	\$72
Delta II 2920	\$1	\$11	\$30	\$29	\$3	\$74
Delta II 2925	\$1	\$11	\$32	\$31	\$4	\$79

Launch Date:Dec-06 Launch Site:CCAFS						
\$M in NOA						
Proposed Vehicle Configurations:	FY-03	FY-04	FY-05	FY-06	FY-07	TOTAL
TAURUS	\$1	\$8	\$21	\$12	\$7	\$48
Delta II 2320	\$1	\$9	\$26	\$25	\$4	\$65
Delta II 2326	\$1	\$10	\$28	\$27	\$4	\$69
Delta II 2420	\$1	\$9	\$27	\$26	\$4	\$67
Delta II 2425	\$1	\$10	\$28	\$27	\$4	\$69
Delta II 2920	\$1	\$10	\$28	\$28	\$4	\$71
Delta II 2925	\$1	\$11	\$31	\$29	\$4	\$76
Delta II 2920H	\$1	\$11	\$31	\$31	\$5	\$79
Delta II 2925H	\$1	\$12	\$34	\$32	\$5	\$84

NOTE: All figures are in real year dollars. Included in these figures are the NTE for the standard launch service, a nominal allocation for typical non-standard services, typical costs for launch site processing, and Telemetry support during the launch phase of the mission.

Figure 6 - ELV Launch Services Cost Estimates